



Breaking the Intergenerational Cycle of Insecure Attachment: A Review of the Effects of Attachment-Based Interventions on Maternal Sensitivity and Infant Security

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Abstract—In this paper the effectiveness of preventive or therapeutic interventions aiming at enhancing parental sensitivity and children's attachment security is addressed. Sixteen pertinent studies have been reviewed, and 12 studies have been included in a quantitative meta-analysis ($N = 869$). Results show that interventions are more effective in changing parental insensitivity ($d = .58$) than in changing children's attachment insecurity ($d = .17$). Longer, more intensive, and therapeutic interventions appear to be less effective than short-term preventive interventions. Interventions which are effective at the behavioral level may not necessarily lead to changes in insecure mental representations of the parents involved. The implications of changes at the behavioral level (sensitivity; attachment) without accompanying changes at the representational level will be discussed.

Keywords: Attachment, maternal sensitivity, interventions, meta-analysis, review

Introduction

In the past few decades attachment research has documented the causes and consequences of insecure infant-parent attachment in some detail. Several studies have shown that insecure attachment in infancy is associated with a higher risk of malfunctioning in the socio-emotional domain during the preschool years (Bretherton, 1985; Sroufe, 1988). Although insecure

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attachment cannot be considered 'pathological' *per se* (Van IJzendoorn & Bakermans-Kranenburg, in press), its status as a risk factor has urged researchers and clinicians to reflect on potentially preventive and corrective measures (Belsky & Nezworski, 1988). Recently, several intervention studies aiming at the prevention or the correction of insecure attachment have been performed, but their effectiveness appeared to be equivocal. One of the purposes of this review is to distill some uniform trend or estimate of the average effect from those studies.

The intervention studies are based on hypotheses about causal factors influencing the development of secure attachment. Many studies have shown that parental sensitivity has to be considered a key factor (Goldsmith & Alansky, 1987). Ainsworth and her colleagues (1978) defined sensitivity as the ability to accurately perceive and interpret the infants' attachment signals, and to respond to them promptly and adequately. A persistent lack of sensitivity and an inconsistent display of sensitivity were found to stimulate the development of an insecure bond between infant and parent. Furthermore, recent studies on the intergenerational transmission of attachment have shown that parental sensitivity and children's attachment were both associated with parents' mental representations of attachment, that is, their perception of their attachment biography (Main, Kaplan & Cassidy, 1985; Van IJzendoorn, in press). Insecure representations of attachment were found to be associated with insensitive responses to the infant's attachment signals, and with an insecure infant-parent attachment relationship. For intervention studies two—complementary—approaches to the problem of preventing or correcting the development of insecure attachments seem to be indicated: First, the intervention efforts may be directed at parental sensitivity, that is, at the behavioral level. Second, interventions may also focus on the parents' mental representations of attachment, that is, on the representational level, in order to pave the way for subsequent behavioral changes. In a simplified form, the model underlying most intervention studies is the following (Fig. 1).

The two types of intervention—the behavioral and the representational approach—are different in design and focus. An example of the first approach is the Anisfeld, Casper, Nozyce and Cunningham (1990) study in which mothers are provided with soft baby carriers to carry their babies during the first months in order to enhance the physical contact between parent and infant. The presupposition is that carrying the baby leads to prompt responses to attachment signals such as crying behavior, and thereby stimulates feelings of security in the infant. The second approach is often modeled after Fraiberg *et al.*'s (Fraiberg, Adelson & Shapiro, 1975) infant-mother psychotherapy in which the parent is enabled to discuss her 'ghosts' of the past, that is, her childhood experiences with insecure attachments, and their influence on the interactions with the child. The intervention study of Lieberman, Weston and Pawl (1991) is an example of this approach. In weekly unstructured sessions at home the intervenors provided support and therapy for the mothers during a year, with the object

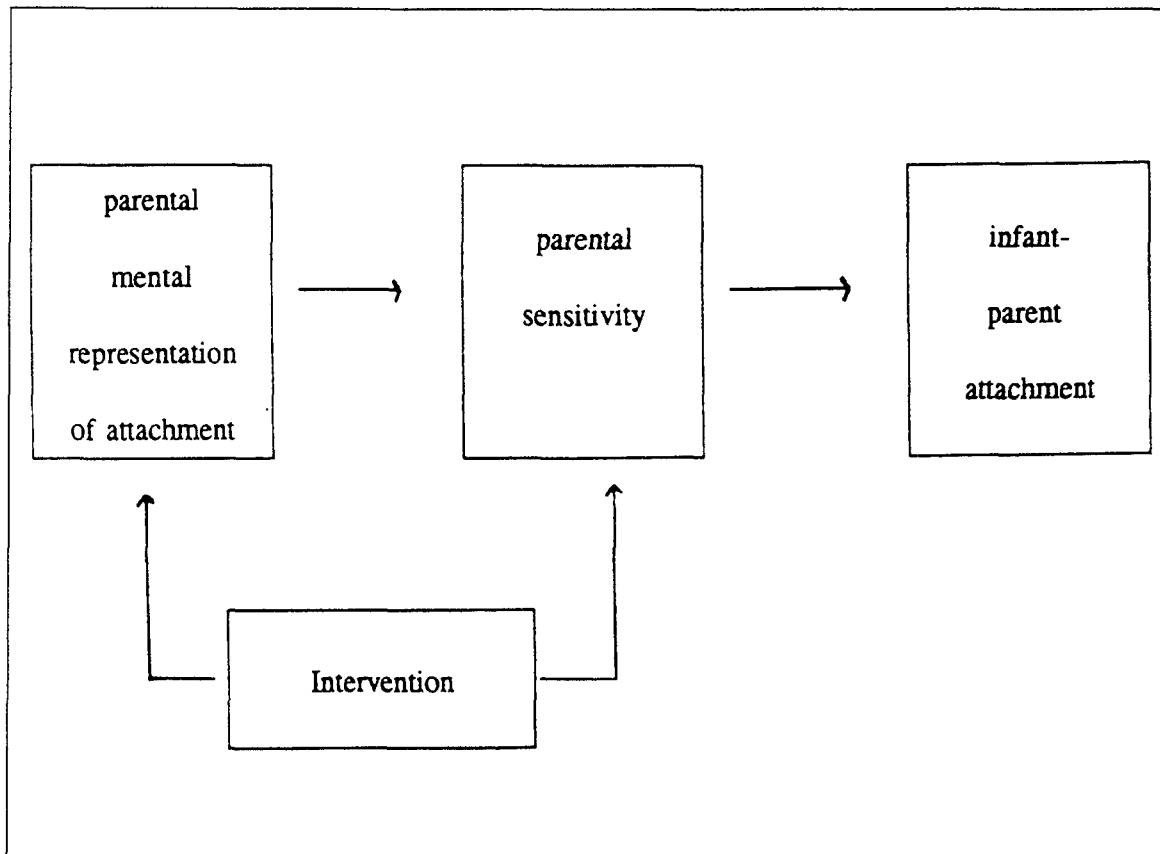


Fig. 1. A model of interventions in attachment.

of enhancing their empathy for the affective and developmental needs of their children.

Intervention studies aiming at attachment are extremely important, not only from an applied viewpoint but also from a theoretical perspective. By means of carefully designed intervention studies, empirical evidence for cause-effect relations might be found. Most research on attachment is correlational—cross-sectional or longitudinal—and it remains complicated to derive causation from correlation (Lamb, Thompson, Gardner & Charnov, 1985). In many studies the correlation between parental sensitivity and children's attachment on the one hand, and between parental attachment representations and children's attachment on the other hand, has been established; but even on the basis of longitudinal designs one can only speculate about causal relations and the absence of third factors (Van IJzendoorn, 1992). The manipulation of the alleged cause, e.g. sensitivity, and observation of predicted changes in the effect, e.g. attachment, constitute a much more direct way of confirming causal hypotheses. Against this background the intervention studies gain even more weight, and their evaluation is important as a test of some core issues in attachment theory.

Several issues and questions may be derived from the various approaches of the intervention studies. First, the intervention studies all focus on

changing the quality of the infant–parent attachment relationship. Their object is to change insecure attachments into secure attachments, or to prevent insecure attachments from developing. The studies pursue this objective by influencing parental sensitivity or parental mental representations of attachment. An important question then is, whether a change of sensitivity or representation does indeed result in a change of infant attachment insecurity, and whether this latter change is comparable to the former in terms of effect size. Because the associations between sensitivity and attachment representations on the one hand, and between sensitivity and infant attachment security on the other hand are far from perfect, it may be hypothesized that intervention studies might more easily reach their proximal goal of changing sensitivity than their ultimate goal of changing attachment security. However, if intervention studies do influence sensitivity but if, at the same time, they do not result in similar changes in attachment security, some doubts about the causal relation between sensitivity and attachment would arise. In Fig. 2 the possible results of intervention studies are presented.

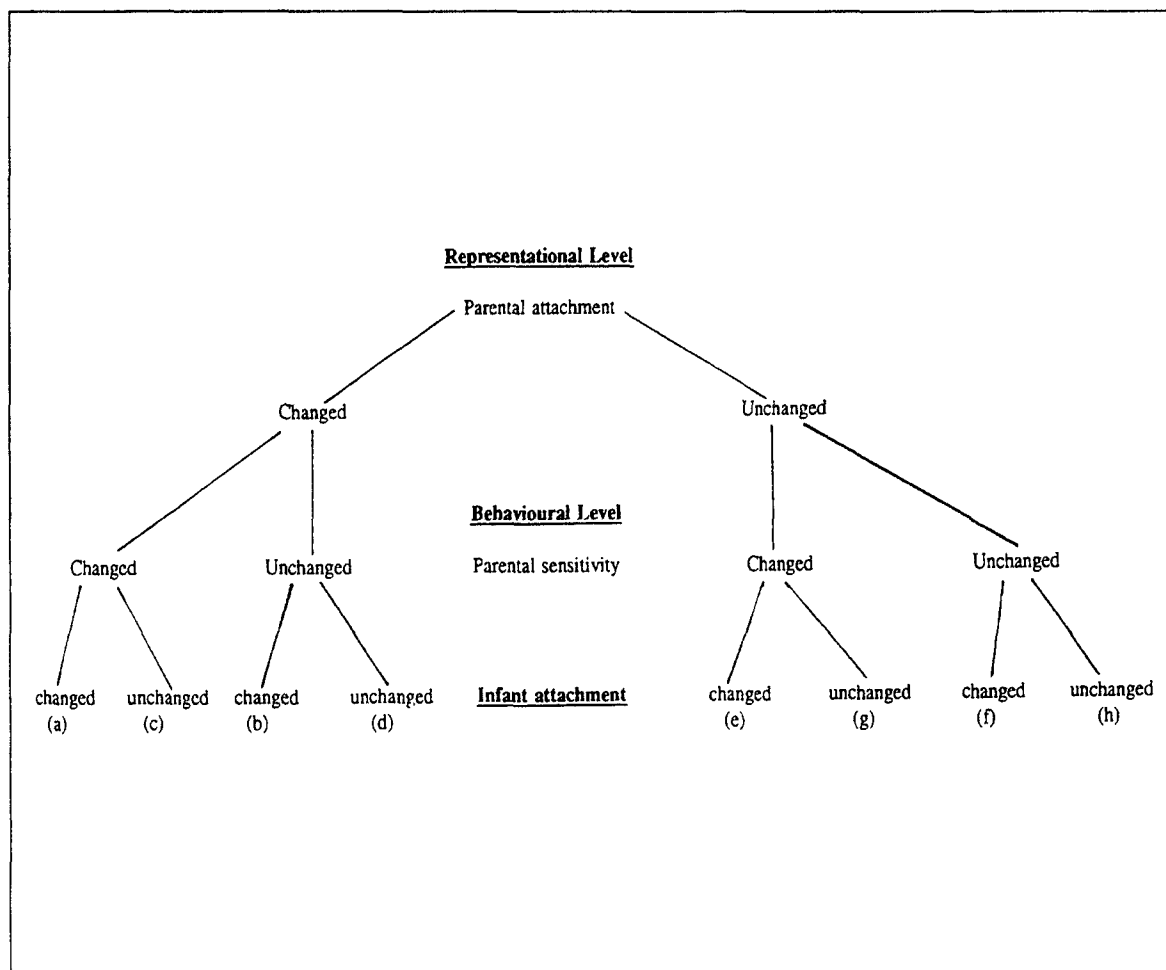


Fig. 2. Hypothetical outcomes of intervention studies on attachment.

In Fig. 2 eight possible outcomes of intervention studies on attachment have been depicted. The possibilities (c) and (g) constitute falsifications of the connection between sensitivity and attachment, because changes in sensitivity are not accompanied by changes in attachment security. Possibilities (d) and (h) mean that the interventions failed to reach their goal of changing infant-parent attachment although, in alternative (d), at least the parental representation of attachment was changed. Possibility (a) is of course the perfect outcome of any intervention study: the change of parental attachment representations is accompanied by a change of sensitivity which results in a changed attachment security. Alternative (b) would mean that changed attachment representations may effect changes in another behavioral domain than sensitivity, and through that channel influence the infant-parent attachment security. Elsewhere, we have shown that the concept of sensitivity cannot carry the whole weight of the intergenerational transmission of attachment, and that other aspects of the parent-child interactions must be responsible for part of the transmission ('the transmission gap', Van IJzendoorn, in press). In alternative (e) the intervention is effective on the behavioral level (sensitivity and attachment) but not on the representational level, and in alternative (f) the change in infant attachment cannot be explained on the basis of changes in parental representations or in sensitivity.

Most intervention studies included in this review do not report on changes in attachment representations. One of the most intriguing issues in this area, however, is the issue of generalizability: If the parent's sensitivity for the infant's attachment cues has been changed, how firmly is this change rooted in the parent's personality and how long will its influence last? It can be imagined that teaching a parent to be sensitive to the infant's attachment signals is effective in the short run, but that it does not generalise to the type of sensitivity required in a next phase of the infant's development. For example, a baby carrier is not useful for toddlers anymore, but they still might need (different kinds of) physical contact for which the intervention has provided no specific training. It may be hypothesized that outcome (e) is even counterproductive in that tensions are created between the parents' representations and their behavior, and in that the children's expectations of sensitive interactions with their parents may not be fulfilled at a later stage, e.g. in toddlerhood.

In this paper we will address the following issues: First, how effective are intervention studies on attachment on average? Is the effectiveness of intervention studies dependent on intervention characteristics such as duration and focus? Second, do intervention studies show similar effects on parental sensitivity as they do on infant-parent attachment security? We expect intervention studies to be somewhat more effective in the proximal domain of sensitive parental behavior. Third, how deeply rooted in personality are changes of sensitivity, that is, are changes at the behavioral level always accompanied by changes at the representational level or can there be a discrepancy which might restrict the generalizability of the changes?

To answer these questions we will review the extant literature, and perform a meta-analysis. The combination of a narrative review and a quantitative meta-analysis provides the most complete overview of the state of the art of intervention. In a narrative review we are able to describe idiosyncratic characteristics of each study and to evaluate their strengths and weaknesses. In the meta-analysis we are able to trace general trends and to test some hypotheses about differential effects.

A Narrative Review of Intervention Studies

Through PsychLit, Dissertation Abstracts, ERIC, consultation of experts, and the 'snowball' method (Mullen, 1989) we have collected 16 intervention studies which at least reported effects (or the absence thereof) on infant-parent attachment. We did not include intervention studies focusing on parental sensitivity, and which did not report on attachment data. The studies may be divided into preventive and therapeutic interventions, and we will discuss these two subsets in two separate sections. In Table 1, we have presented an overview of the basic characteristics of the intervention studies.

Preventive interventions

This type of intervention study is based on the model of parent education programs and programs for parental support. Some preventive studies are of quite short duration, of a few months, with a relatively small number of personal contacts between intervenors and subjects. Other preventive studies are, however, more laborious. The interventions are often particularly focused on the behavioral level, that is, they try to enhance parental sensitivity.

Anisfeld *et al.* (1990) designed their experiment to test the hypothesis that increased physical contact would promote more maternal sensitivity and more secure attachment between infant and mother in a low SES, predominantly Hispanic and African-American sample. Newborn infants were randomly assigned to an experimental group ($N = 23$) that received soft baby carriers leading to more physical contact, or to a control group ($N = 26$) that received plastic infant seats. Most mothers used the baby carrier quite intensively (half of them daily) for the first 8.5 months. At 3.5 months a global sensitivity rating was completed; the authors used Crnic's scale for sensitivity to the baby's cues, state, and rhythm. At 13 months the Strange Situation procedure (Ainsworth *et al.*, 1978) was used to assess the quality of infant-mother attachment. Experimental mothers received higher ratings on the sensitivity scale but the difference was not significant. In the experimental group, however, 83% of the infants appeared to be securely attached, whereas in the control group only 38% was secure. This difference was significant. The authors conclude that the process of being carried close to the mother seemed to have had an effect on the infant's attachment security above and beyond that attributable to increased maternal sensitivity as measured by the Crnic scale (Anisfeld *et al.*, 1990).

Barnard, Magyary, Sumner, Booth, Mitchell and Spieker (1988) recruited pregnant women with low social support. Subjects were randomly assigned to either the Mental Health Model ($N = 68$) or the Information/Resource Model ($N = 79$). This latter model was a regular support program for disadvantaged young mothers, and it served as the 'dummy' treatment in this experiment. The Mental Health Model focused on developing a supportive relationship with the pregnant women through a series of home visits. Nurses with graduate training supported the women in daily life situations, provided a role model and tried to increase the mother's social competence. The treatment was completed at the end of the baby's first year. Parental sensitivity was measured with the Nursing Child Assessment Teaching Scale (NCATS) at intake, 1, and 2 years. Infant-mother attachment was measured with the Ainsworth Strange Situation procedure at 13 and 20 months. The mothers in the experimental group were rated as more sensitive and competent on the NCATS, but there were no differences on the security of attachment classifications at 13 months; overall only 45% of the infants demonstrated a secure attachment relationship.

Jacobson and Frye (1991) studied the effects of social support to newly delivered low-SES mothers participating in the federally funded Women, Infants and Children food supplementation program. Pregnant women were randomly assigned to either an experimental ($N = 23$) or a control ($N = 23$) group. Subjects in the experimental group were regularly visited at home by a 'volunteer coach', starting visits during pregnancy and continuing throughout the first year of life. The coach talked with the mother about the pregnancy, and about preparations for the coming baby; she also talked with the mother about her expectations, developmental milestones and health concerns, and the kinds of activities mothers and infants enjoy together. The Home Observation for Measurement of the Environment (HOME; Caldwell & Bradley, 1984) was administered at 13 months to assess maternal involvement with the child, and security of attachment was assessed using Waters and Deane's (1985) Attachment Q-Sort procedure at home at 14 months. Mothers in the two groups did not differ on the HOME inventory or on any of the HOME subscales at 13 months. Nevertheless, the two groups differed significantly on the Attachment Q-Sort: Children in the experimental group appeared to be more secure on the Summary Attachment Ratings scale.

In the same line, Beckwith (1988) reports on a preventive intervention project designed to provide supportive home-visitor services to parents of infants who were at double jeopardy, both biologically and socially, that is, sick preterm infants being raised by low-income parents. The intervention started in hospital and was continued throughout the first year; 35 families were visited at home regularly by a professional home-visitor who tried to develop a trusting, supportive relationship, and provided concrete assistance as well as helping the parent to develop observational skills towards their infants. A matched comparison group of 35 families participated in measures for quality of mother-infant interaction and security of attachment.

Table 1. Characteristics of intervention studies

Authors	Sample	Age Child at start	Intervention	Intensity	Design	Post-test attachment	Procedure/age of child
Anisfeld <i>et al.</i> (1990)	low SES <i>N</i> = 49	immediately after birth	soft baby carrier	8,5 mo.	post-test only contr. group	exp. group: 83% secure control group: 38% secure	SSP*/13 mo.
Barnard <i>et al.</i> (1988)	women with low social support <i>N</i> = 95	during pregnancy	supportive relation with home-visitor	> 1 yr.	exp. + contr. group dummy-interv.	exp. group vs. no difference contr. group	SSP/13 mo.
Barnett <i>et al.</i> (1987)	highly anxious middle class <i>N</i> = 52	immediately after birth	general support anti-anxiety measures	1 yr.	post-test only control group	exp. group: 59% secure control group: 74% secure	SSP/12 mo.
Beckwith (1988)	low SES sick prematures after birth <i>N</i> = 70	immediately after birth	supportive relation with home-visitor	1 yr.	pre-test-post-test control group	exp. group: 51% secure control group: 51% secure	SSP/13 mo.
Brinich <i>et al.</i> (1989)	nonorganic failure-to-thrive <i>N</i> = 59	5 mo.	three kinds of support during home-visits	1 yr.	no control group	3 groups: no difference	SSP/12 mo.
Erickson <i>et al.</i> (1992)	low SES first borns <i>N</i> = 154	during pregnancy	multiservice program M-C psychotherapy	1 yr.	pre-test-post-test control group	exp. group: 46% secure control group: 67% secure	SSP/13 mo.
Jacobson <i>et al.</i> (1991)	low income first borns <i>N</i> = 46	during pregnancy	supportive relation with home-visitor	> 1 yr.	exp. + contr. group	exp. group vs. $p < .005$ contr. group	Q-sort/ 14 mo.
Juffer (1993)	adopted first children <i>N</i> = 90	6 mo.	video-intervention/ written information	3 sessions	pre-test-post-test control group	exp. group: 90% secure control group: 70% secure	SSP/12 mo.
Juffer <i>et al.</i> (1994)	insecure low SES mother <i>N</i> = 1	11 mo.	video/written information; biographical discussions	4 sessions	case-study	change from insecure → secure	SSP/14 mo. AAI/14 mo.

(continued opposite)

Table 1. Characteristics of intervention studies—continued

Authors	Sample	Age Child at start	Intervention	Intensity	Design	Post-test attachment	Procedure/age of child
Lambermon and Van IJzendoorn (1989)	mothers with large or small network first borns N = 32	6 wks.	parent education	4 times (by mail)	randomized block-design	exp. group: 50% secure base-line 38% secure	SSP/15 mo.
Leifer <i>et al.</i> (1989)	depressive mother N = 1	7 mo.	individual therapy + 2 yrs. M-C psychotherapy	2 yrs.	case-study	change from insecure → secure	SSP/20 mo.
Lieberman <i>et al.</i> (1991)	low SES insecure children N = 82	12 mo.	M-C psychotherapy	1 yr weekly	randomized block-design	exp. versus control group significant	Q-sort/24 mo.
Lyons-Ruth <i>et al.</i> (1990)	low SES multirisk mothers N = 28	5 mo.	supportive home-visits	47 visits	exp. + contr. group	exp. group: 57% secure control group: 20% secure	SSP/12 mo.
Meij (1992)	low SES first borns N = 78	6 mo.	video-intervention/ written information	3 sessions	pre-test-post-test control group	exp. group: 88% secure control group: 77% secure	SSP/12 mo.
Murray <i>et al.</i> (in press)	insecure child N = 1	18 mo.	M-C psychotherapy	8 weekly sessions	case-study	change from insecure → secure	SSP/20 mo.
Van den Boom (1988)	low SES irritable first borns N = 100	6 mo.	supportive home-visits	3 sessions	four-group design (Solomon)	exp. group: 68% secure control group: 28% secure	SSP/12 mo.

*SSP = Strange Situation Procedure

†Q-sort = Waters' Attachment Q-sort

Beckwith found that the intervention was associated with increased maternal involvement and an increased level of reciprocal interactions at 9 months. Intervention was not associated with an increase in security of attachment at 13 months. A small majority of the infants in both groups were securely attached (51%). The author suggested that because of differential attrition (more mothers discontinued participation in the control group) the intervention group was at higher risk on the continuum of caretaking casualty (Sameroff & Chandler, 1975), which might have decreased the intervention effect.

Lyons-Ruth, Connell, Grunebaum and Botein (1990) assigned weekly home-visiting services to 31 infants at high social risk due to the combined effects of poverty, maternal depression and caretaking inadequacy. The goals of the services were: providing an accepting and trustworthy relationship; increasing the family's competence in assessing resources to meet basic needs; modelling and reinforcing more interactive, positive and developmentally appropriate exchanges between mother and infant; and decreasing social isolation. A control group was established by a similar clinical referral process as was used to identify the intervention group, but this group of 10 families was referred at 18 months and was assessed prior to any intervention. We consider that group to be the control group (the authors mention a community group of 35 families which they use as a second comparison group). The Ainsworth sensitivity scale was used to assess maternal sensitivity to infant's attachment cues at 18 months, as well as a Covert Hostility scale, an Interfering Manipulation scale, and a Flatness-of-Affect Scale. The scales loaded high on a factor labeled Maternal Involvement, which was used here as an adequate approximation of sensitivity. Infant-mother attachment security was assessed with the Strange Situation procedure. The authors found no significant effects of treatment on maternal sensitivity or involvement. The intervention was successful, however, in affecting attachment security: Among untreated high-risk infants there was a very high rate of insecure infants (80%) as compared to the high-risk infants who did receive treatment (43%). The authors suggest that their measures for maternal sensitivity did not tap the specific interactive patterns in a high-risk group. The nonrandomized design might provide another explanation for the differential effects on sensitivity and attachment.

Barnett, Blignault, Holmes, Payne and Parker (1987) collected Strange Situation data in an Australian, nonclinical sample of 134 infant-mother pairs. A few days after delivery, mothers were screened on state and trait anxiety measures and the high-anxiety subjects were randomly assigned to a professional intervention ($N = 29$), to a nonprofessional intervention ($N = 28$), or to a control group ($N = 23$). The professional intervention was provided for 12 months by female social workers who offered general support and specific anti-anxiety measures, promoted self-esteem, and encouraged appropriate maternal sensitivity to infant cues. For the non-professional intervention, an experienced mother was asked to offer the support. Only the professional intervention resulted in a significant anxiety-

reducing effect, and here we will compare the professional intervention with the untreated high-anxiety group. The intervention was not effective in changing attachment security: In the control group 74% of the infants were securely attached, whereas in the intervention group only 59% of the infants were securely attached. The negative effect might be caused by the high percentage of security in the control group: a ceiling effect cannot be excluded as an alternative interpretation.

In The Netherlands, several intervention studies have been carried out, and their common characteristic is the short duration, three or four contacts between a supportive coach and the mothers. Van den Boom (1988;1991) focused on a 100 highly irritable infants from lower-class families, and her intervention aimed at enhancing maternal sensitivity between the sixth and ninth month of the baby's life. The intervenor visited the mothers three times at home, and assisted them to adjust their behaviors to the infants' unique cues, in particular to negative signals such as crying. But the intervenor also paid attention to stimulating playful interaction. The intervention was continuously monitored by means of the same observational system that was used in the pre- and post-tests. The quality of mother-infant interactions was observed at the age of 6 (pre-test) and 9 months (post-test). Several sensitivity ratings and frequency scores were included in an overall measure for maternal responsiveness. The quality of the infant-mother attachment relationship was measured by the Strange Situation procedure at 12 months. A Solomon four-group randomized design was used to control for potential pre-test effects. Mothers who participated in the intervention were significantly more responsive on the post-test than the control mothers. Furthermore, the intervention was successful in changing attachment insecurity. In the experimental group 68% of the infants appeared to be secure, whereas only 28% of the infants in the control group were securely attached to their mother. The majority of the untreated irritable infants were avoidantly attached (56%).

Two replications have been carried out to test the stability and generalizability of the results of this highly effective and efficient parent education program. Meij (1992) studied the effects of a comparable intervention program in a sample of 78 lower-class families. In this case, the intervention, aiming at enhancing the quality of parental sensitivity, appeared to be less effective. In one subsample ($N = 26$) the parents participated in a similar intervention as Van den Boom's (1988). In a second subsample ($N = 26$) only a booklet was provided with information about parent-infant interaction. The third subsample was the control group. No short-term or long-term effects were found for maternal sensitivity as measured by the Ainsworth sensitivity scale. With regard to the quality of attachment it was found that neither at the age of 12 months nor at the age of 18 months were the intervention programs effective. The author noted that a relatively high number of infants in this sample were securely attached (77%) which may have caused a ceiling effect.

The second replication was carried out in a sample of 90 Dutch adoptive

families (Juffer, 1993). The infants came from Sri Lanka and South Korea and were adopted at a very early age (within a few months after birth). There were two types of interventions aimed at enhancing parents' sensitivity and infants' attachment security: the first type consisted of written information only and the second type combined written information with three visits of video home-trainers who gave feedback on the mother-infant interaction videotaped at home. Although a large majority of the control infants were securely attached (70%), the most intensive intervention program with video-feedback resulted in a significant increase of securely attached infants (90%). The intervention was also effective in enhancing maternal sensitivity as measured with the Ainsworth sensitivity and cooperation scales.

Lambermon (1991; Lambermon & Van IJzendoorn, 1989) studied the effects of two types of parent education programs—videotaped and written information about sensitive parenting—in a sample of 35 families with extremely small or extremely large social networks. The design was a pre-test–post-test design with two factors: experimental condition (written or videotaped information) and size of social network (small or large). The pre-tests were performed between the 6th and 8th week, the intervention took 4 weeks, and the post-tests were performed between the 13th and 16th week after birth. Maternal sensitivity was rated on several scales developed by Ainsworth, and by Belsky. At 15 months the Strange Situation procedure was completed. The results of the study have demonstrated that the written material was superior to the videotaped information in influencing maternal sensitivity. Videotaped models of 'strange' mothers and infants caused identification problems for several participating mothers. The intervention groups did not differ significantly in percentage of secure infant–mother dyads, and in both groups 50–62% were insecurely attached. Because the written information appeared to be more effective than the videotaped information, and because there were no reasons to suspect that the videotaped information would have led to negative effects (Lambermon, 1991), the videogroup was considered to provide the base-line for evaluating the effects of the written information.

Brinich, Drotar and Brinich (1989) studied the effects of three types of intervention on the security of attachment in 59 children with early histories of nonorganic failure to thrive (NOFT). All children (33 African-American) were from economically disadvantaged families, the majority of whom received Aid to Dependent Children. The infants were randomly assigned to one of three time-limited intervention plans with an average duration of 1 year, that were conducted at home. The type of intervention was not expected to influence patterns of attachment at 12 months while intervention was still going on (Brinich *et al.*, 1989). Interventions were terminated when the children were at an average age of 14 months. The three interventions—family centered; parent centered; and advocacy—did indeed not affect security of attachment differentially. A small majority of the total sample (51%) was securely attached. A control group was absent for ethical reasons so no treatment group received a dummy treatment.

Therapeutic interventions

Whereas preventive interventions aim at enhancing parental sensitivity through support, information, feedback and modelling, therapeutic approaches start with the idea that parents have to remember and re-experience their childhood anxieties and sufferings (the 'ghosts in the nursery') in order to be sensitive to their infants' attachment signals (Fraiberg *et al.*, 1975). In fact, more than preventive interventions, parent-infant psychotherapy emphasizes the representational level in trying to break the cycle of intergenerational transmission of insecure attachments (Carter, Osofsky & Hann, 1991; Cramer *et al.*, 1990; Wright, 1986). Therapeutic interventions are, of course, not exclusively focused on the representational level, but include many behavioral components as well.

Lieberman *et al.* (1991) studied the effects of therapeutic intervention in a sample of 93 low-SES, Spanish-speaking mothers recently immigrated from Mexico or Central America to the U.S.A. At 12 months the Strange Situation procedure was completed, and 59 insecurely attached dyads were randomly assigned to the intervention ($N = 34$) and a control group ($N = 25$). The securely attached dyads formed a second 'control' group which we have not included in our review. The intervention started immediately after the Strange Situation assessment, and continued throughout the second year of life with unstructured home visits taking place weekly. The intervention was meant to provide the mother with a corrective attachment experience and to enable her to explore her own attachment biography as well as her current feelings of anger and ambivalence towards others (including the child and the intervenor). The intervenor also provided appropriately timed developmental information, but she abstained from didactic teaching. At 24 months, security of attachment was assessed using Waters and Deane's (1985) Attachment Q-Sort which was completed by the intervenor. During a free-play session, maternal emphatic responsiveness was rated on a scale using criteria based on body orientation, postural and facial expression, and timing and context of responses. Experimental mothers appeared to have higher scores on emphatic responsiveness, whereas there were no group differences on the Attachment Q-Sort. Although the authors also report on another attachment measure, we selected this measure of attachment security because it is a widely used and validated instrument (Vaughn & Waters, 1990).

Egeland and Erickson (1993; Erickson, Korfmacher & Egeland, 1992) report on the preliminary results of their STEEP project (Steps Toward Effective Enjoyable Parenting) for high-risk mothers and infants. STEEP is aimed at enhancing the quality of the infant-mother attachment relationship through the modification of the mother's mental representation of attachment. STEEP helps mothers to face their own developmental history, to examine its effects on parenting, and to express the (anxious) feelings arising from past and present attachment relationships. The study involved 154 high-risk mothers who were pregnant with their first child at the time of recruitment. They were at risk because of poverty, lack of education, single status, social isolation and unstable life arrangements in general. Seventy-four

mothers were randomly assigned to STEEP which started with home visits and group meetings before birth and continued throughout the first year after birth. Experimental mothers were more sensitive to the infants' attachment signals, were more stimulating (as indicated by the HOME), and were generally more competent in managing their daily life. Unfortunately, at 13 months only 46% of the STEEP intervention infants appeared to be securely attached, whereas 67% of the controls were securely attached. The authors speculate that the 'insight'-oriented approach to intervention may not be effective in a group of mothers with serious behavioral, intellectual and adjustment problems. Another possibility might be that this approach needs more time to trickle through (the so-called 'sleeper'-effect).

Murray and Cooper (in press) present a case-study on the effects of a short-term mother-infant psychotherapy. The infant was insecurely attached to her mother at 18 months. The intervention of eight weekly sessions aimed at enhancing this relationship. The Adult Attachment Interview (Main & Goldwyn, 1985-1993) to assess the representation of the attachment biography was completed by the mother before the start of the sessions to direct the psychotherapy. After the sessions, the Strange Situation procedure was completed to assess infant-mother attachment security. The infant was securely attached at the post-test, and the authors also report a change of mental representation of attachment in the mother. They found a shift from dismissing to autonomous attachment. The latter finding, however, was not based on a second Adult Attachment Interview but on the discourse with the mother as part of the evaluation.

Another interesting case-study is presented by Leifer, Wax, Leventhal-Belfer, Fouchia and Morrison (1989). They describe a quantitative single case study to illustrate how an early intervention program used two therapeutic modalities to treat a depressed mother and her 2-month-old son. The first treatment started when the infant was 7 months old and lasted for a period of 8 months (15 sessions). The second treatment started when the infant was 15 months old and continued for almost another year. The treatment modalities included psychodynamically oriented individual therapy and parent-infant relationship treatment in which the dyad was also seen by a second therapist. The authors found that at 12 months the maternal sensitivity continued to be low, and the quality of the infant-mother attachment relationship was anxiously-avoidant. At 18 months, the mother began to show more sensitivity and less intrusiveness. At 20 months the attachment relationship was evaluated to be secure with some traces of avoidance. Anecdotally the authors describe changes in mental representation of attachment: the mother began to connect her current fear of dealing with her child's attachment needs to her own attachment experiences as a child. She was also able to reflect on some positive features of her childhood. Her lifelong fear of dependence which had affected her attachment to her child, was finally examined within the safety of the therapeutic relationship and this seemed to lead to a more balanced attachment representation.

Juffer, Duyvesteyn and Van IJzendoorn (1994) present a case-study in

which an insecure-dismissing mother with her 11-month-old daughter participated. The case is part of a larger pre-test/post-test control group design. The Adult Attachment Interview and Ainsworth's sensitivity measure were used as pre-and post-tests, and the Strange Situation procedure was included in the post-test. The intervention was implemented between the 11th and 13th month after the birth of the firstborn baby. In four intervention sessions the mother received written information about sensitive interaction with infants, feedback on video-taped interactions with her child, and the intervenor involved the mother in discussions about her childhood attachment experiences in relation to the current interaction with the baby. At the pre-test the mother appeared to be insecure-dismissing (Main & Goldwyn, 1985-1993), and her sensitivity rating was rather low (3.3 on the Ainsworth nine-point scale). At the post-test the mother again had to be classified as insecure-dismissing, but her sensitivity rating was almost 2 scale points higher. This change on the behavioral level was reflected in the Strange Situation assessment. At 14 months the child was classified as securely attached to her mother. In sum, at the time of recruitment the mother demonstrated an insecure-dismissing representation of her attachment biography, and she appeared to be extremely insensitive to the infant's attachment cues. After four intervention sessions in which the mother received concrete feedback on her interactions with her daughter, and talked intensively about her past attachment experiences, she showed much more sensitivity, and her child appeared to be securely attached. Nevertheless, the mother's representation of attachment still remained insecure.

A Meta-Analysis of Intervention Studies

From the intervention studies we derived the relevant statistics to determine the effects on parental sensitivity and on infant-mother attachment security. In the case of parental sensitivity we chose those (composite) measures that were most closely associated with the original Ainsworth scale for sensitivity. In most studies the same measure for quality of attachment was used, i.e. the Strange Situation procedure. In the meta-analysis we addressed the following questions: (1) Do interventions enhance the parent's sensitivity to infant's attachment cues, and, if so, how large is the average effect? (2) Do interventions enhance the quality of the infant-mother attachment relationship, and if so, how large is the average improvement? We defined improvement here as a change from an insecure to a secure attachment relationship.

We have presented the relevant statistics in Table 2. For meta-analytic purposes we have had to exclude the case-studies and the study by Brinich *et al.* (1989), in which an untreated control group was lacking. Twelve studies were included in this meta-analysis. Earlier meta-analyses in the area of attachment were based on similar number of studies (Goldsmith & Alansky, 1987; Fox, Kimmerly & Schafer, 1991). The statistics for sensitivity and

attachment have been presented separately. Because the statistics are quite divergent, we have computed a common meta-analytic indicator for effect size: Cohen's d , that is the standardized difference between the means of the experimental and control group (Mullen, 1989; Rosenthal, 1991). On this basis, we have computed the combined effect sizes for sensitivity and for attachment, for which the separate effect sizes were weighted by the size of the samples (Mullen, 1989).

Although intervention studies are time-consuming and expensive, almost 900 mother-infant dyads have participated in this type of study. They have profited from the interventions: the combined effect size for sensitivity is

Table 2. Intervention studies on sensitivity and attachment: meta-analytic data

Study	Year	N	Measure	Sensitivity			Attachment*	
				Statistic	d		Measure statistic	d
1. Anisfeld <i>et al.</i>	1990	49	sensitivity (Crnic)	$F(1,42) = 2.96$	.53	SSP	$p = .019$	.62
2. Barnard <i>et al.</i>	1988	95	NCATS	$p < .05$	.34	SSP	$p = .50$	.00
3. Barnett <i>et al.</i>	1987	52	—	—	—	SSP	$\chi^2 = 1.32$	-.32
4. Beckwith	1988	70	involvement	$p = .05$	.40	SSP	$p = .50$	.00
5. Erickson† <i>et al.</i>	1992	135	HOME	$p = .05$	.29	SSP	$p = .008$	-.42
6. Jacobson and Frye	1991	46	involvement	$p = .50$	.00	Q-Sort	$t = 3.21$	.97
7. Juffer‡	1993	90	sens/coop. (Ainsworth)	$p = .03$	.50	SSP	$\chi^2 = 3.75$	.42
8. Lambermon and Van IJzendoorn§	1989	32	responsive involvement	$F(1,31) = 5.34$	.83	SSP	$\chi^2 = 0.51$	.25
9. Lieberman|| <i>et al.</i>	1991	82	empathic responsiveness	$t(51) = 2.506$	.70	Q-Sort	$t(51) = -.445$	-.12
10. Lyons-Ruth <i>et al.</i>	1990	40	involvement (composite)	$p = .50$	.00	SSP	$p^¶ = .04$	.58
11. Meij‡	1992	78	sensitivity (Ainsworth)	$t(49) = -.028$	-.01	SSP	$\chi^2(1;51) = 1.076$	.29
12. Van den Boom	1988	100	sensitivity (composite)	$F(1,90) = 154.95$	2.62	SSP	$p = .001$	.65
Total		$N = 869$		$d = .58$			$d = .17$	

* In case of more than one measurement, the first is included; SSP = Strange Situation procedure; † estimated data for sensitivity; ‡ cumulative intervention versus control group; § attachment data derived from Lambermon (1991); || intervention group versus insecure control group; ¶ exact Fisher p -values for forced classifications.

$d = .58$, which is highly significant. Against the background of Cohen's (1988) criteria for weak ($d = .20$), medium ($d = .50$), and strong ($d = .80$) effect sizes, the interventions have been rather successful in enhancing parents' sensitivity to infants' cues. The effectiveness of the studies is, however, quite heterogeneous. The intervention by Van den Boom (1988) was by far the most effective ($d = 2.62$), whereas its replication by Meij (1992) did not show any effect at all. We have already mentioned the possibility of a ceiling effect in the case of Meij's study.

The combined effect size for quality of attachment is considerably weaker: $d = .17$ which is significant at the $p = .036$ level. According to Cohen's (1988) criteria this effect size is weak. Cohen equals $d = .17$ to a correlation coefficient of $r = .09$, which is less than 1% explained variation in attachment security. Rosenthal (1991), however, introduced the so-called 'binomial effect size display' (BESD) as a more adequate indicator of size and relevance of the effect, and demonstrated that even $d = .17$ can be of great practical importance. Rosenthal (1991) mentions several studies in the medical sciences showing effect sizes smaller than $d = .17$ which nevertheless provided important practical (and theoretical) applications.

The combined effect size seems to be an adequate indicator of the global trend in this set of 12 studies because outlying studies are lacking. The negative effects of Lieberman *et al.* (1991), Erickson *et al.* (1992), and Barnett *et al.* (1987) should, however, be noted. Although these negative effects are quite weak, they nevertheless represent the possibility of counterproductive results and 'iatrogenic damage'. It is puzzling that the interventions with negative effects were therapeutic and intensive (Cramer *et al.*, 1990). In fact, the combined effect size for the long-term interventions ($N = 7$) was $d = .00$, whereas the combined effect size for the short-term interventions was $d = .48$. Maybe the narrow scope of the behaviorally oriented short-term interventions is a key factor in changing the infant-mother attachment relationship.

The difference between the combined effect size for sensitivity and for attachment is rather large. Of course, one would expect interventions aiming at enhancing maternal sensitivity to be most successful in reaching this proximal goal. In most interventions, secure attachment is the distal goal, to be reached through a change of sensitivity. We should also note that, in that case, the effect of interventions on attachment is dependent on the influence of a change in sensitivity on the quality of the attachment relationship. This influence cannot be stronger than the association between sensitivity and attachment. The intervention studies presuppose that sensitivity is the most important and strongest determinant of attachment, but meta-analytic data show that the association is modest (Goldsmith & Alansky, 1987). Furthermore, there might be other ways in which infant-mother attachment is influenced (Van IJzendoorn, in press). Therefore, interventions aiming at enhancing sensitivity may only have modest effects on attachment. Although the difference between effect sizes for sensitivity and attachment is rather large, it might be somewhat inflated for two reasons. First, several measures

for sensitivity exist and some researchers might have chosen to report on the measures with the strongest effects. For attachment, only two generally accepted measures exist—the Strange Situation procedure and the Attachment Q-Sort. Second, attachment security as measured by the Strange Situation procedure is a dichotomous variable (insecure versus secure), which might restrict the intervention effects. The sensitivity measures are continuous, and restriction of range is not plausible here.

Discussion

The intervention studies presented above have a common goal: to enhance the quality of the infant–mother attachment relationship. Their intervention strategies, designs, and effectiveness are quite divergent.

The scope of the interventions differs widely between studies. Many studies aim at enhancing physical contact between mothers and infants (soft baby carriers) or sensitive interactions in general, because these factors are considered to be crucial in shaping the infants' attachment relationship to their mothers. Some studies also aim at the maternal attachment representation, and try to offer the mothers a supportive, therapeutic relationship that serves as a safe base to explore the 'ghosts' of the past. Both types of intervention, however, use similar criteria for effectiveness: change of insensitivity and infant attachment insecurity. For studies focusing on the representational level, though, the proximal goal of changing maternal attachment representations might be reached without accompanying changes at the behavioral level—which may come later in time. Although the Lieberman *et al.* (1991) and Egeland and Erickson (1993) studies did not show significant positive effects on infant attachment security, they might have been effective in changing maternal attachment representations, but the authors have not (yet) collected or reported data on the representational level.

In addition, the interventions differ strongly in terms of focus. Some studies use a very narrow scope and are only designed to change a concrete aspect of mother–infant interactions (Anisfeld *et al.*, 1990; Van den Boom, 1988). If these interventions are successful, it is exactly clear what part of the intervention programme is responsible for the effective change. Other studies, however, use a very wide scope and offer general, supportive services to help disadvantaged mothers to survive in a poor environment. The Egeland and Erickson (1993) intervention program is, in fact, a multi-service package addressing not only childrearing problems but also financial, insurance, housing and other practical issues. In multi-problem samples it may even be impossible to focus only on enhancing mother–infant interactions without taking the social context into account. But when urgent 'survival' needs dominate the intervention, it may well be at the cost of the effectiveness at the level of maternal sensitivity. And even if the broad-band approach is effective in changing attachment relationships it will be difficult to trace this effect back to specific facets of the program.

The interventions also differ strongly in terms of intensity, that is, the number and kind of contacts between intervenors and subjects. Some studies did not provide personal interaction between staff and subjects at all, but offered a soft baby carrier (Anisfeld *et al.*, 1990), or written information about sensitive parenting (Lambermon, 1991). Other studies included three home visits (Juffer, 1993; Van den Boom, 1988) and still other studies provided more than 50 personal contacts between coaches and families (Lieberman *et al.*, 1991; Lyons-Ruth *et al.*, 1990). Considering the broad range of intervention contacts, it is puzzling to see that long-term interventions do not seem to be more effective than short-term interventions in reaching the same goal: enhancing the child's attachment security. One of the explanations may be that the more intensive interventions were carried out in groups with multiple, and more serious problems. In terms of attachment security, though, some short-term interventions were effective in groups with only about 30% securely attached children (control group; Van den Boom, 1988), whereas some long-term interventions were ineffective in groups with more than 60% securely attached infants (control group; Egeland & Erickson, 1993). If personal interaction between intervenor and subject is used to teach adequate parenting strategies or to provide feedback on videotaped behavior, the interventions seem to be more successful than in the case of therapeutic assistance—which again is puzzling. We should not exclude the possibility, however, that in the long run therapeutic interventions will be more effective because they affect the roots of insecure attachments in the parent's own childhood attachment experiences.

The designs of the intervention studies range from randomized pre-test/post-test control group designs to single case-studies. The majority of the studies use one or the other form of randomized experimental designs, and this type of design allows, in principle, for valid conclusions. Nevertheless, in some studies differential attrition is an important drawback, (e.g. Egeland & Erickson, 1993) because the similarity of experimental and control group may be jeopardized. In the long-term, intensive intervention studies, parents in the control group may become demotivated, in particular when they experience many problems for which they do not receive help. At the post-test the control group may seem to function better, only because the families with the most serious problems stopped participating. In short-term intervention studies it may be much easier to prevent attrition, and to avoid its differential effects on the experimental and control groups. Therefore, they may seem to be more effective than long-term interventions. In line with the problem of attrition is the possibility of a ceiling effect. If the control group shows an overrepresentation of securely attached infants at the post-test, it will be very difficult for any intervention to prove its effectiveness. It may, in fact, even be ethically debatable whether to intervene in families without insecure attachments (e.g. Meij, 1992), because positive effects cannot be expected and counterproductive effects might not be excluded.

Lastly, the generalizability of the results may be difficult to establish. Many intervention studies did not only include insecurely attached infant-mother

dyads, but dyads at risk for many reasons, such as physical, socio-economic, or mental reasons. Every sample seems to be characterized by a very complex constellation of depriving factors, and it may be impossible to outline the population from which they have been drawn. For the time being it seems safest to assume that interventions may only be effective in families with an overrepresentation of insecure attachments, but there may be limits to the severity of the problems for which attachment-oriented interventions can provide solutions. The generalizability of the results may also be restricted to the behavioral level, and to the short-term. On the basis of the current studies we do not know whether the interventions affect the parents' attachment representations; because longitudinal intervention studies are still missing, we do not know whether behavioral changes in the first phase of attachment formation will be stable throughout the preschool years.

Conclusions

From our narrative review and meta-analysis we may derive the following conclusions: (1) Interventions are effective in enhancing maternal sensitivity to infant's attachment cues; (2) Interventions may be effective in enhancing the quality of the infant-mother attachment relationship, but the size of the effect is small; (3) Short-term interventions with a clear focus appear to be more effective than long-term broad-band interventions; (4) Enhancing maternal sensitivity and infant attachment security does not necessarily imply a change in maternal attachment representation.

The intervention studies represent almost all hypothetical outcomes as described in Fig. 2. The case-studies of Murray and Cooper (in press), and Leifer *et al.* (1989) seem to represent the most optimal outcome of changes in maternal attachment representations, maternal sensitivity, and infant attachment security (a). In contrast, Barnett *et al.* (1987) and Meij (1992) did not effect any change, but they did not measure attachment representations (d or h). Three studies were successful in enhancing maternal sensitivity and infant attachment security (a or e), but attachment representations were not measured (Anisfeld *et al.*, 1990; Juffer, 1993; Van den Boom, 1988). Five studies were successful in changing maternal sensitivity only (c or g) (Barnard *et al.*, 1988; Beckwith, 1988; Erickson *et al.*, 1992; Lambermon, 1991; Lieberman *et al.*, 1991). Two studies resulted in some change of attachment security only (b or f) without accompanying change of sensitivity (Jacobson & Frye, 1991; Lyons-Ruth *et al.*, 1990). Our case-study (Juffer *et al.*, 1994) was an example of possibility (e): changes in maternal sensitivity and infant attachment security without changes in maternal attachment representations.

From our meta-analysis we may conclude that the association between maternal sensitivity and infant attachment security indeed is a causal relation. Overall, enhancing maternal sensitivity implied a (small) improvement in infant attachment security. Sensitivity is, however, not a necessary nor a sufficient condition for attachment security. Some studies were able to

enhance attachment security without changing sensitivity (not a necessary condition), whereas other studies effected increased sensitivity without accompanying improvement of infant attachment security (not a sufficient condition). In this respect we want to emphasize two conclusions: first, the empirical impact of sensitivity on attachment appears to be only modest and not in accordance with its central position in attachment theory. Second, there must be other ways in which parents influence their children's attachment formation than through sensitive interactions (cf. Van IJzendoorn, *in press*). In attachment theory, the search for alternative pathways to attachment (in-)security should be opened.

Our case-study showed that interventions may create discrepancies between the representational and the behavioral level, that is, they may be effective in enhancing parental sensitivity and infant attachment without influencing parental attachment representations (Juffer *et al.*, 1994). If parents only acquire new behavioral strategies to interact with their infant, they may not be able to find ways to deal with the attachment needs of the developing child. Because they are still dismissive of, or preoccupied with, their own attachment biography, they might be less creative and flexible, and more defensive than secure parents in interacting with toddlers or older children who are exploring the boundaries of their physical and social environment. The generalizability of the intervention might, therefore, be restricted. In the long run, the discrepancy between the representational and the behavioral level may even be counterproductive because the child may experience a discontinuity between the sensitive parent in the early years, and the lack of parental responsiveness later on.

Another interpretation of the discrepancy would be more optimistic: the change at the behavioral level may, after some time, induce a change at the representational level ('sleepers-effect'). It may take more time to change mental representations than to learn new behavioral strategies. Furthermore, a securely attached child may provoke positive interactions with the parent, not only in infancy but also in toddlerhood. Bowlby (1982) emphasized the stability of interaction patterns that become self-fulfilling prophecies: from a transactional perspective (Sameroff & Chandler, 1975), the child may reinforce the mother's sensitive behavior, even at a later stage of development. The child may help to break the intergenerational cycle of insecure attachment, because the current positive attachment experiences may enable the mother to re-enact her negative attachment experiences of the past (Fraiberg *et al.*, 1975).

Our review has shown that behaviorally oriented, short-term interventions may be most effective in enhancing infants' attachment security, but these interventions may not break the intergenerational cycle of insecure attachment by changing infants' as well as parents' attachment insecurity. In the long run, interventions that also enhance parents' secure attachment representations may be more effective. More research is needed to test this hypothesis. Future intervention studies should compare the effectiveness of a behavioral approach with a representational type of intervention. In a

longitudinal experimental design, it is possible to study the long term consequences of each intervention modality for both the behavioral and representational dimension of attachment formation in parents and in their children.

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